

**WHAT IS CLAIMED IS:**

1. A method for recovering at least one platinum group metal (PGM) species from a feed product selected from the group consisting of chromite ore, chromite ore concentrate and PGM concentrate comprising the steps of :
  - 5 a. mixing the feed with at least one salt so as to produce a mixture, whereby the concentration of salt in the mixture is sufficient to convert at least one PGM species into a corresponding PGM chloride salt; and
  - 10 b. contacting the mixture with gaseous chlorine and CO at a temperature between about 240°C and 800°C to induce the conversion of at least one species of PGM into a corresponding PGM chloride salt,
  - 15 whereby said chloride salt of at least one PGM species can be recovered.
2. A method as recited in claim 1, wherein said temperature is between about 250°C and about 800°C.
3. A method as recited in claim 1, wherein said temperature is between about 350°C and about 800°C.
- 20 4. A method as recited in claim 1, wherein said temperature is between about 500°C and about 800°C.
5. A method as recited in claim 1, wherein said temperature is between about 500°C and about 720°C.
- 25 6. A method as recited in claim 1, wherein said temperature is between about 600°C and about 800°C.
7. A method as recited in claim 1, wherein said temperature is between about 620°C and about 800°C.
8. A method as recited in claim 1, wherein said temperature is between about 650°C and about 800°C.
- 30 9. A method as recited in claim 1, wherein said temperature is between about 660°C and about 800°C.
10. A method as recited in claim 1, wherein said temperature is between about 500°C and about 720°C.

11. A method as recited in any one of claims 1 to 10, wherein the carbochlorination is performed at a flow rate of at least 20ml/min.
12. A method as recited in any one of claims 1 to 11, wherein the at least one salt is selected from the group consisting of NaCl, KCl and MgCl<sub>2</sub> and a combination thereof.
13. A method as recited in any one of claims 1 to 11, wherein the salt is NaCl.
14. A method as recited in any one of claims 1 to 11, wherein the salt is NaCl and forms at least about 5% w/w of the mixture.
15. A method as recited in any one of claims 1 to 11, wherein the salt is NaCl and forms about 5% to about 20% w/w of the mixture.
16. A method for simultaneously recovering at least one platinum group metal (PGM) species from a chromite product selected from the group consisting of chromite ore and chromite ore concentrate and increasing the Cr/Fe ratio of the chromite product comprising the steps of :
- a. mixing the feed with at least one salt so as to produce a mixture, whereby the concentration of salt in the mixture is selected to induce the selective extraction of iron and is sufficient to convert at least one PGM species into a corresponding PGM chloride salt; and
- b. contacting the mixture with gaseous chlorine and CO at a temperature of between about 240°C and 750°C so as to 1) induce the formation of a thin film of a melt around the chromite product, 2) promote the selective chlorination of iron and 3) convert at least one PGM species into a corresponding PGM chloride salt, whereby at least one PGM species chloride salt is recovered and an iron impoverished chromite product is yielded having an increased chromite to iron ratio as compared to that of the chromite product.
17. A method as recited in claim 16, wherein the at least one salt is selected from the group consisting of NaCl, KCl and MgCl<sub>2</sub> and a combination thereof.
18. A method as recited in claim 17, wherein the at least one salt is in a concentration of about 5% w/w to about 10% w/w in the

mixture.

19. A method as recited in claim 17, wherein the at least one salt is NaCl in a concentration of about 5% w/w to about 10% w/w in the mixture.
- 5 20. A method as recited in claim 17, wherein the at least one salt is NaCl in a concentration of about 5% w/w in the mixture.
21. A method as recited in any one of claims 12-20, wherein the step of chlorinating the mixture is performed with a chlorine flow rate of at least about 60ml/min.
- 10 22. A method as recited in any one of claims 12-20, wherein the step of chlorinating the mixture is performed with a chlorine flow rate of at least about 200ml/min.
23. A method as recited in any one of claims 12 to 22, wherein the temperature is between about 250° and about 720°C.
- 15 24. A method as recited in any one of claims 12 to 22, wherein the temperature is between about 670° and about 720°C.
25. A method as recited in any one of claims 1 to 24, wherein the  $\text{Cl}_2/\text{CO}$  ratio is between about 0.5 and about 1.5.
- 20 26. A method as recited in any one of claims 1 to 25, wherein the mixture is dried before chlorination.
27. A method as recited in any one of claims 1 to 26, wherein  $\text{N}_2$  is used as a carrier gas during chlorination.
28. A method as recited in any one of claims 1 to 27, wherein the duration of the chlorination is about 30 minutes to about 2 hours.
- 25 29. A method as recited in any one of claims 1 to 28, wherein the duration of the chlorination is about 2 hours.